MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2017/2018

PBM0054 – MATHEMATICS

(Foundation in Business)

8 MARCH 2018
2.30 p.m. – 4.30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 3 pages with **FIVE** questions.
2. Attempt **ALL** five questions. The distribution of the marks for each question is given.
3. Please write all your answers in the answer booklet provided. All necessary workings **MUST** be shown.

Question 1

a. Simplify the following expression as a single quotient in which all exponents are positive.

$$\left(\frac{32p^{18}q^{-14}r^{22}}{4p^{7}q^{6}r^{15}}\right)^{-4}$$ (4 marks)

b. Factor completely $24a^2x^4 - 375a^5x$. (5 marks)

c. Solve the inequality:

$$\frac{6x^2 - 11x + 3}{x^2 - 2x - 3} \leq 0$$ (6 marks)

d. Determine the domain of each function:

i. $f(x) = \dfrac{2x+5}{4x^3 - 9x + 24x^2 - 54}$ (3 marks)

ii. $f(x) = \dfrac{\sqrt{x-3}}{x-6}$ (2 marks)

e. i. Find the intersection point, $P(x, y)$ between $3x - 4y = 18$ and $5y + 2x + 11 = 0$. (2 marks)

ii. Hence find the equation of the line that is perpendicular to $5y + 2x + 11 = 0$ and passes through the point $P(x, y)$. (3 marks)

(Total = 25 marks)

Continued...

Question 2

a. Write the following expression as a single logarithm and simplify the expression.

$$\log(x^2-5x-14)-\log(x^2-4)$$ (3 marks)

b. Solve the following equations.

i. $2^3\left(2^{x^2}\right)=16^x$ (3 marks)

ii. $\ln\dfrac{\left(\dfrac{x}{x-1}\right)\left(\dfrac{x+1}{x}\right)}{(x-1)}=\ln 5$ (6 marks)

(Total = 12 marks)

Question 3

Solve the following system of linear equations using the inverse of coefficient matrix.

$$\begin{aligned} x+8y+8z&=8\\ 3x-y+3z&=5\\ -2x-4y-6z&=5 \end{aligned}$$ (13 marks)

(Total = 13 marks)

Question 4

a. Find the $\dfrac{dy}{dx}$ for the given functions and simplify the answers.

i. $y=x^{100}-\dfrac{1}{27x^3}+\dfrac{7}{\sqrt[5]{x^4}}$ (4 marks)

ii. $y=\left(\dfrac{x^3-4}{2x^5+3}\right)^{\frac{1}{3}}$ (5 marks)

b. Find $f'(2)$ if $f(x)=\left(3+2x^{-1}\right)\left(x^{-5}-1\right)$. (5 marks)

c. Given $y=\left(2x^3+3\right)^{-2}$. Show that $y''=\dfrac{24x\left(7x^3-3\right)}{\left(2x^3+3\right)^4}$. (5 marks)

d. Find the equation of the tangent line to the curve $y=\left(x^3-1\right)^3\left(x^4+1\right)^2$ at the point $x=-1$. (6 marks)

(Total = 25 marks)

Continued...

Question 5

a. Find the following integrals:

i. $\int 8+16x^{-5}-\frac{1}{\sqrt[5]{x^2}}\,dx$ (3 marks)

ii. $\int_0^1 \left(4x^3-3\right)^4 2x^2\,dx$ (7 marks)

iii. $\int \frac{\left(7+x^{-3}\right)\left(2-x^{-\frac{1}{3}}\right)}{\sqrt{x}}\,dx$ (7 marks)

b. Bryan is taking a learning test in which the time he takes to memorize items from a given list is recorded. Let $M(t)$ be the number of items he can memorize in t minutes. His learning rate is found to be $M'(t)=0.4t-0.005t^2$.

i. How many items can Bryan memorize during the first 10 minutes? (4 marks)

ii. How many additional items can he memorize in the next 10 minutes? (4 marks)

[Note: Round your answers to the nearest integer.]

(Total = 25 marks)

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